Post-MiFID Developments in Equity Market Liquidity

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INTRODUCTION

The Markets in Financial Instruments Directive (MiFID), which came into force on 1 November 2007, fostered competition between established exchanges and alternative trading systems while creating a legislative framework to regulate that competition. MiFID abolished the concentration rule, which required orders to go through domestic regulated markets, and created three categories of venues for the organisation and execution of securities transactions: regulated markets (RMs), multilateral trading facilities (MTFs) and systematic internalisers (SIs). The same pre- and post-trade transparency requirements apply to all venues except dark pools, which are MTFs whose trading mechanisms do not generate price discovery and which are exempt from pre-trade transparency rules. Under the post-trade transparency rules introduced by MiFID, all transactions in regulated financial instruments must be reported to the market, even if they are carried out over the counter (OTC). Such disclosures do not have to be made to the regulated primary market; they may be made using proprietary resources or submitted to a trade reporting facility (TRF).

The biggest change since MiFID came into effect is surely the rise of MTFs and their ability to capture a substantial share of order flow. There has been much debate over this issue: some believe that heightened competition has pushed down transaction costs; others argue that increased fragmentation has widened bid-ask spreads on the main equity markets. To assess MiFID's impact on transaction costs, it is important to distinguish explicit and implicit costs. In terms of explicit transaction costs, MTFs have generally grown market share in return for drastically reduced explicit fees[1]. In terms of implicit costs, several regulated markets agree that bid-ask spreads on the most actively traded stocks have increased since end-2007. However, it is hard to say to what extent increased spreads are attributable to fragmentation or to the financial crisis and the ensuing surge in volatility.

This study seeks to measure the change in liquidity and implicit transaction costs for a sample of large and mid caps since the introduction of MiFID, contextualising these developments by taking fluctuations in volatility into account. Section 2 describes the institutional framework, selected observation periods and data used. Section 3 assesses order-flow fragmentation and the intensity of competition between trading systems since MiFID's introduction. Section 4 looks at how liquidity changed between the observation periods. Section 5 summarises the main findings.

[1] Generally, MTFs apply an explicit costs structure that treats aggressive orders differently from orders that provide liquidity to the market. Chi-X, Turquoise and BATS Europe charge around 30 basis points (bps) for aggressive orders, while orders that provide liquidity earn a rebate of 15 or 20 bps. Some exchanges have responded by lowering their explicit costs, a step taken by the London Stock Exchange in August 2008.

I. INSTITUTIONAL FRAMEWORK AND DATA

Three groups – Deutsche Boerse, LSE-Borsa Italiana and NYSE-Euronext – currently dominate Europe's securities trading industry. They run the most active regulated markets and also own MTFs. Their RMs are challenged by a handful of pan-European MTFs that emerged in 2007 and 2008: Chi-X, owned by Instinet, a broker; Turquoise, which was launched by a consortium of investment banks and then acquired by LSE; Nasdaq OMX Europe, which belongs to the Nasdaq OMX group; and BATS Europe, the subsidiary of BATS, a US exchange. PLUS Markets, a new UK exchange, operates as an RM for small caps and as an MTF for European securities, although it is mainly specialised in small and mid caps. The legislation on transaction reporting introduced by MiFID also led to the creation of several TRFs that offer MiFID-compliant services. The largest of these by market share is the BOAT platform of Markit, a financial information provider. Table 1 charts the key events in the development of Europe's RMs, MTFs and TRFs.

Table 1. Development of the main European RMs, MTFs and TRFs: a brief history

Date	Event
22 September 2000	Amsterdam, Brussels and Paris exchanges merge, **Euronext** created
30 January 2002	Euronext group absorbs Lisbon exchange
September 2006	Nine investment banks create **BOAT**, a MiFID-compliant TRF
30 March 2007	**Chi-X** MTF begins trading in 5 Dutch stocks and 5 German stocks
4 April 2007	**NYSE** and **Euronext** merge, following announcement on 1 June 2006
12 April 2007	**Chi-X** extends trading to all DAX 30 constituents
13 April 2007	Chi-X extends trading to all AEX 25 constituents
29 June 2007	Chi-X begins trading in 11 FTSE 100 stocks
13 July 2007	Chi-X extends trading to all FTSE 100 stocks
28 September 2007	Chi-X begins trading in 19 CAC 40 stocks
8 and 22 October 2007	Chi-X extends trading to all other CAC 40 stocks
4 July 2008	Chi-X begins trading in Belgian stocks
21 August 2008	Chi-X extends trading to mid caps
2008 to today	Progressive expansion in universe of stocks traded on Chi-X
1 October 2007	**LSE** acquires Borsa Italiana
22 January 2008	Financial information provider **Markit** acquires **BOAT** TRF
22 September 2008	Pan-European platform **Turquoise** launched
1 October 2008	Pan-European platform **Nasdaq OMX Europe** launched
31 October 2008	**BATS Europe** launched as MTF for LSE, Euronext and Deutsche Boerse stocks
9 March 2009	NYSE-Euronext launches MTF **NYSE Arca Europe**
21 December 2009	Announcement that **LSE** is taking 60% stake in **Turquoise**, later reduced to 51%; Turquoise merged with Baikal, another MTF
2 November 2009	Deutsche Boerse launches **Xetra International Market** platform

I.1. *Sample and observation periods*

The study analyses a sample comprising **32 CAC 40 stocks, 51 FTSE 100 stocks and 57 SBF 120 stocks that are not in the CAC 40 index**. These stocks were selected because they were continually in the index in 2007, 2008 and 2009. Financial stocks were excluded. (See the annex for a complete list.)

The study consisted in comparing the liquidity of the stocks in the sample over four one-month observation periods. One period is before MiFID's entry into force, while the other three are after. The post-MiFID periods correspond to different levels of fragmentation and volatility. Table 2 gives a timetable and details some of the characteristics of the four observation periods.

The pre-MiFID period (October 2007) comes just after the start-up of Chi•X but precedes the launch of the other MTFs. The three post-MiFID observation periods (January, June and September 2009) come after the launch of all the MTFs that now have visible market share, but correspond to different levels of market volatility. October 2007 and September 2009 are very different in terms of fragmentation, but are comparable in terms of volatility, measured by the standard deviation of daily returns on the CAC 40 and FTSE 100 indices.

Table 2. Characteristics of observation periods

Observation period	Regulatory framework	MTFs operating	Volatility	Fragmentation	Number of trading days
October 2007	Pre-MiFID	Chi-X for FTSE 100, starting up for CAC 40 securities, PLUS	Baseline	None or weak	23
January 2009	Post-MiFID	Chi-X, Turquoise, Nasdaq OMX Europe, BATS Europe, PLUS	Extreme, owing to financial crisis	Significant	21
June 2009	Post-MiFID	Chi-X, Turquoise, Nasdaq OMX Europe, BATS Europe, PLUS	Lower but still high and above Oct. 2007 level	Significant	21
September 2009	Post-MiFID	Chi-X, Turquoise, Nasdaq OMX Europe, BATS Europe, PLUS	Comparable to October 2007, slightly higher	Significant	21

I.2. *Data*

Intelligent Financial Systems (IFS) kindly provided the high-frequency data used in this study. The data were generated from the original dataflows of the Euronext, LSE and Deutsche Boerse regulated markets, the Chi-X, Turquoise, Nasdaq OMX Europe, BATS Europe and PLUS MTFs, and BOAT, Markit's TRF. The database includes transaction and best-limit data time-stamped to the second for all the abovementioned markets.

For each trade, transaction data include the price, the volume and the best limits displayed on each RM and MTF in the sample at the time of the trade. Euronext and LSE data cover opening and closing auction transactions as well as transactions during continuous trading. LSE data include an indicator that can be used to identify trades executed on the SETS order book, off-book trades executed by LSE members, and trades reported to LSE's European Trade Reporting Service but not executed on LSE's regulated market. The third category of trades (reported to LSE's European Trade Reporting Service but not executed on the regulated market) and trades reported by BOAT are OTC trades or trades executed by SIs.

For each RM and MTF, the data on best limits include the best bid and ask price as posted every second of the session with associated disclosed quantities. No quotes are provided for BOAT, so any prices offered by SIs are not available. Based on these data, the best bid price on all competing markets and the best ask price on the same markets are determined. The difference between these two prices divided by their median value is the quoted spread resulting from matching quotes on all markets. It will be called the **global quoted spread** in the remainder of the study, as contrasted with the **local quoted spreads** observed on individual markets.

II. COMPETITION BETWEEN TRADING VENUES

This section assesses the fragmentation of order flow since MiFID's introduction. A first sub-section reviews the distribution of trading volumes between the primary markets, other RMs, MTFs and OTC or regulated internalisation in September 2009. The second sub-section describes the evolution of competition between RMs and MTFs between October 2007, just before MiFID came into force, and September 2009, two years later.

II.1. *Fragmentation of regulated and OTC order flow in September 2009*

Charts 1, 2 and 3 describe the market shares of the primary market, other regulated markets, MTFs and internalisation in FTSE 100, CAC 40 and other SBF 120 stocks respectively in September 2009. Part A of Table 3 condenses the data from Charts 1, 2 and 3, while Part B presents the same statistics for continuous trading only, excluding opening and closing auctions on the primary market. The primary market is found to have a majority share of order-flow execution in all the samples. If we calculate a fragmentation index by summing the squares of the market shares of each trading venue and the square of the internalisation share[2], then taking the inverse of that sum, fragmentation is comparable for FTSE 100 stocks (index of 2.7) and CAC 40 stocks (index of 2.65). Comparing the CAC 40 and the SBF 120 reveals that order flow is much less fragmented in mid caps than in large caps, with Euronext capturing over 70% of volumes for the former, compared with 55% for the latter.

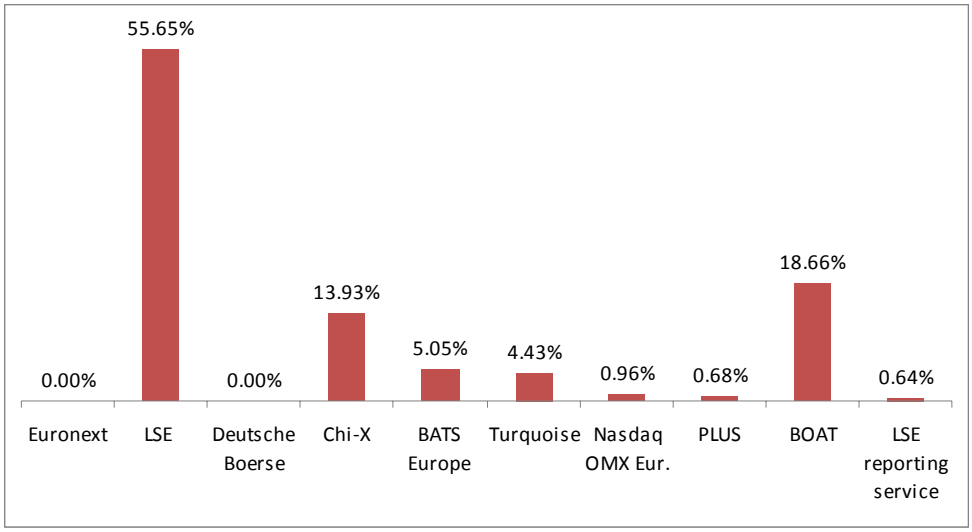
In terms of the MTFs' competitive position, three players stand out: Chi•X, Turquoise and BATS Europe. Chi-X is the clear frontrunner with over 10% of volumes in the three samples. BATS Europe and Turquoise are on a par in terms of market share (3%-4% for the CAC 40, 4%-5% for the FTSE 100). BATS Europe leads Turquoise in UK stocks, but Turquoise has the edge in French stocks.

There is virtually no competition between the regulated markets. Euronext loses a few trades to LSE and Deutsche Boerse, but no more than 1%-2% of volumes, and Euronext and Deutsche Boerse have zero market share in LSE stocks. If the RMs are to compete, they will surely do so through the pan-European MTFs that they have created, namely NYSE Arca Europe for Euronext and Xetra International Market for Deutsche Boerse.

[2] Off-exchange trades reported by BOAT and LSE.

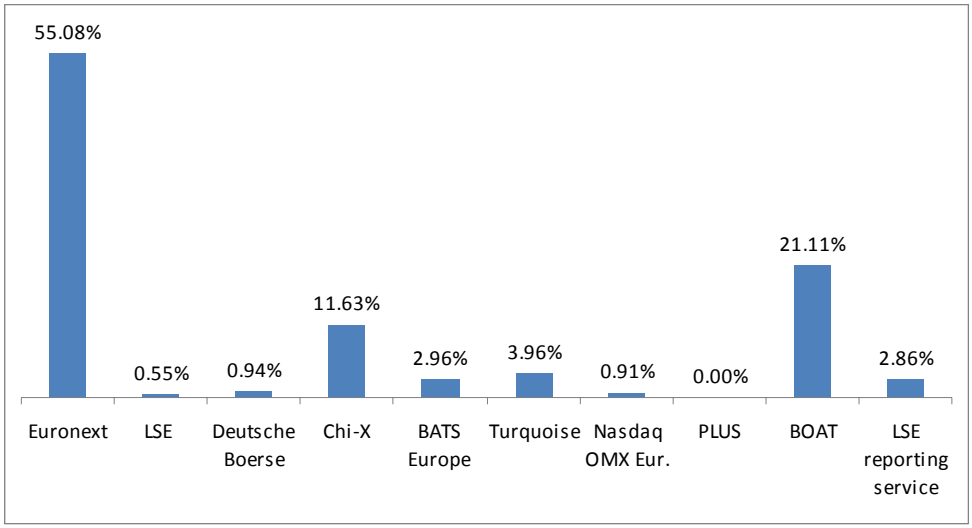
Internalisation and OTC account for around 20% of total volumes on the CAC 40 and FTSE 100. The share is slightly lower than 20% for UK large caps and significantly higher (approximately 24%) for French large caps. These percentages are almost certainly underestimated because BOAT and LSE's reporting service do not account for all OTC and internalised volumes, but since BOAT is the market leader in post-trade reporting, the estimate may be considered to be in the right order of magnitude.

Chart 1. Distribution of trading volumes, FTSE 100 stocks, September 2009



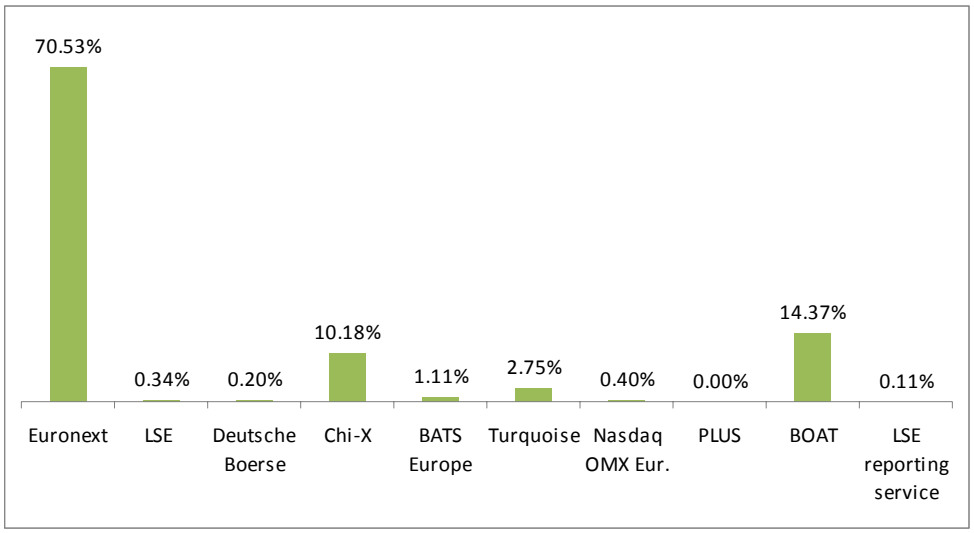
These statistics are based on a transaction universe including trades executed in LSE opening and closing auctions (SETS system) and trades executed OTC or by SIs (BOAT and LSE reporting service). LSE's market share encompasses transactions executed on and off the order book.

Chart 2. Distribution of trading volumes, CAC 40 stocks, September 2009



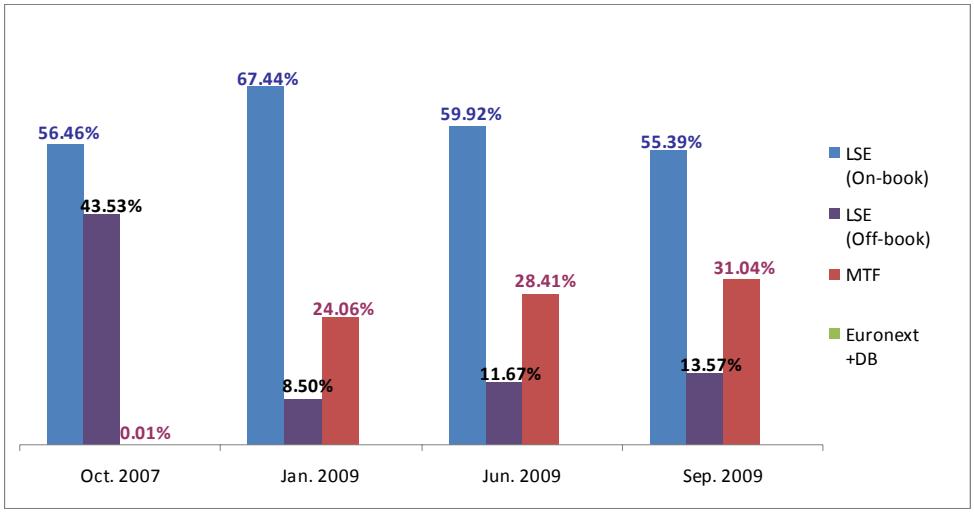
These statistics are based on a transaction universe including trades executed in Euronext opening and closing auctions (UTP system) and trades executed OTC or by SIs (BOAT and LSE reporting service).

Chart 3. Distribution of trading volumes, SBF 120 stocks (excluding CAC 40), September 2009



These statistics are based on a transaction universe including trades executed in Euronext opening and closing auctions (UTP system) and trades executed OTC or by SIs (BOAT and LSE reporting service).

Chart 4. Distribution of trading volumes between RMs and MTFs, FTSE 100 stocks, October 2007 to September 2009



These statistics are based on a reduced transaction universe including only RMs and MTFs. Trades executed in LSE opening and closing auctions (SETS system) are included. OTC and internalisation are excluded. LSE's share is separated into on- and off-book trades.

Table 3. Relative market shares, trading volumes, September 2009

	Trading volumes, EUR 000	Euronext	LSE	Deutsche Boerse	Chi-X	BATS Europe	Turquoise	Nasdaq OMX Eur.	PLUS	BOAT	LSE Reporting service
Part A.											
Auctions and continuous trading											
FTSE 100 stocks	97,610,437.95	0.00%	55.65%	0.00%	13.93%	5.05%	4.43%	0.96%	0.68%	18.66%	0.64%
CAC 40 stocks	99,760,432.13	55.08%	0.55%	0.94%	11.63%	2.96%	3.96%	0.91%	0.00%	21.11%	2.86%
SBF 120 stocks not in CAC 40	13,959,376.78	70.53%	0.34%	0.20%	10.18%	1.11%	2.75%	0.40%	0.00%	14.37%	0.11%
Part B.											
Continuous trading only											
FTSE 100 stocks	84,694,595.90	0.00%	53.35%	0.00%	16.05%	5.82%	5.10%	1.10%	0.78%	17.29%	0.50%
CAC 40 stocks	83,918,213.46	51.51%	0.57%	1.03%	13.82%	3.52%	4.71%	1.08%	0.00%	20.81%	2.94%
SBF 120 stocks not in CAC 40	12,131,265.95	70.18%	0.37%	0.22%	11.71%	1.28%	3.17%	0.46%	0.01%	12.46%	0.13%

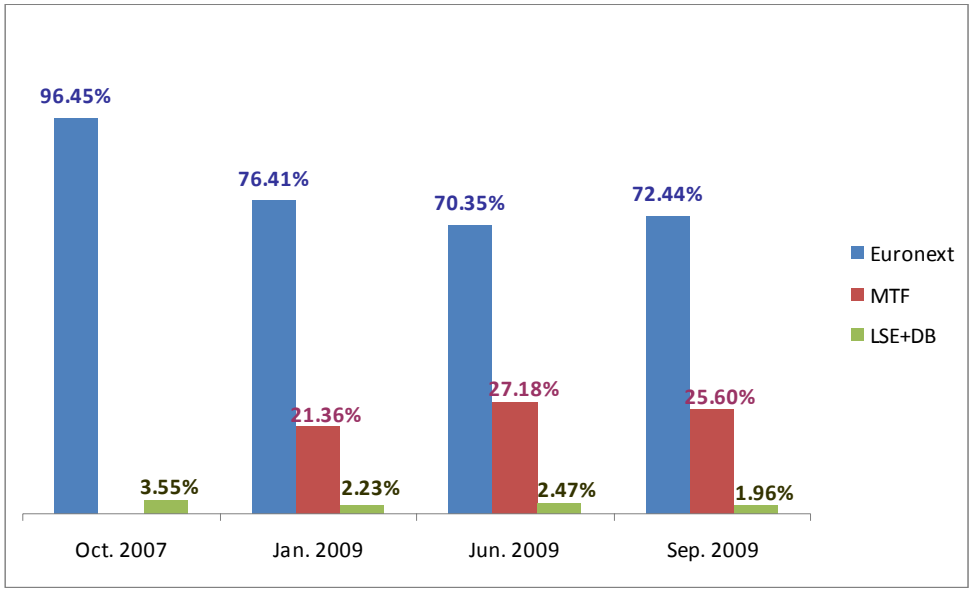
This table shows the relative market shares of trading venues in September 2009 for each sample of stocks. The second column shows total trading volumes in thousands of euros. All trading volumes, regulated and OTC, are included in the statistics. OTC trades and trades executed by SIs included in the statistics are those reported by BOAT or LSE. Part A of the table reports market shares when primary market auction transactions are included. Part B reduces the sample to transactions executed in continuous trading.

Table 4. Distribution of trading volumes between RMs and MTFs, October 2007 to September 2009

Sample	Period	Trading volumes, EUR 000	Euronext	LSE	Deutsche Boerse	Chi-X	BATS Europe	Turquoise	Nasdaq OMX Eur.	PLUS	Fragmentation index
FTSE 100 stocks	**Oct. 2007**	191,652,999.96	0.00%	99.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	1.00
	Jan. 2009	76,368,643.35	0.00%	75.94%	0.00%	14.72%	1.72%	5.82%	0.29%	1.52%	1.66
	Jun. 2009	90,706,501.84	0.00%	71.59%	0.00%	17.14%	4.36%	4.58%	0.71%	1.62%	1.83
	Sep. 2009	78,769,760.35	0.00%	68.96%	0.00%	17.26%	6.26%	5.49%	1.19%	0.84%	1.95
CAC 40 stocks	**Oct. 2007**	105,322,607.21	96.45%	2.92%	0.63%	0.00%	0.00%	0.00%	0.00%	0.00%	1.07
	Jan. 2009	66,111,453.33	76.41%	1.63%	0.61%	13.07%	1.28%	6.93%	0.08%	0.01%	1.65
	Jun. 2009	67,564,708.11	70.35%	1.18%	1.30%	16.42%	6.18%	3.74%	0.84%	0.00%	1.90
	Sep. 2009	75,847,833.64	72.44%	0.72%	1.24%	15.29%	3.89%	5.21%	1.19%	0.01%	1.81
SBF 120 stocks not in CAC 40	**Oct. 2007**	17,582,701.32	99.99%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00
	Jan. 2009	8,569,063.99	92.87%	1.15%	0.01%	5.11%	0.31%	0.51%	0.03%	0.01%	1.16
	Jun. 2009	9,625,223.73	80.61%	0.95%	0.02%	13.87%	2.11%	2.26%	0.19%	0.00%	1.49
	Sep. 2009	11,937,753.18	82.47%	0.40%	0.23%	11.90%	1.30%	3.22%	0.47%	0.01%	1.44

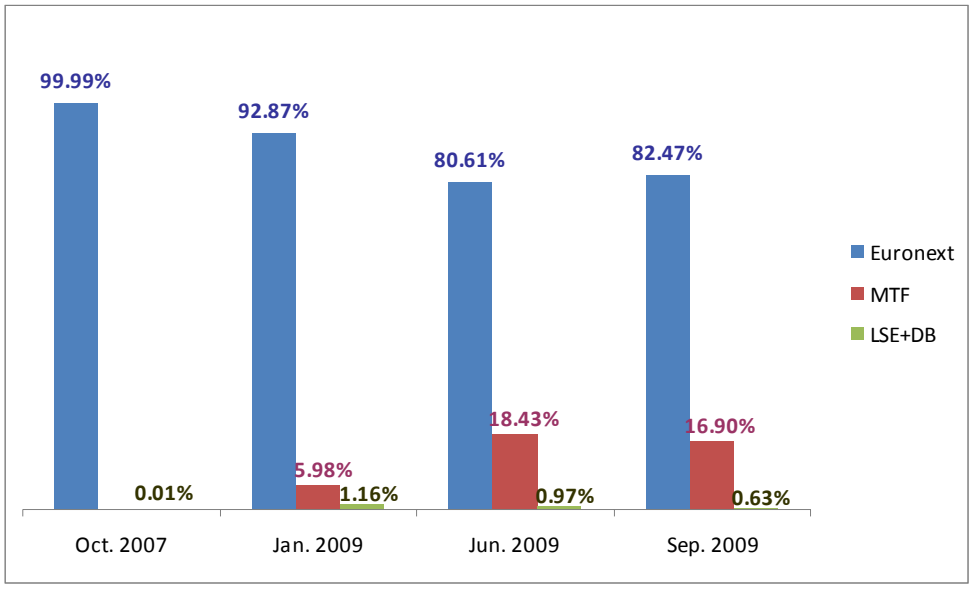
This table shows the relative market shares of trading venues for each sample of stocks in each of the observation periods. The statistics are based on a reduced transaction universe comprising RMs and MTFs. Transactions executed during opening and closing auctions on the primary market are included. OTC trades and internalisation are excluded. The third column shows total trading volumes in thousands of euros. The last column gives a fragmentation index calculated by taking the inverse of the sum of the squares of market shares.

Chart 5. Distribution of trading volumes between RMs and MTFs, CAC 40 stocks, October 2007 to September 2009



These statistics are based on a reduced transaction universe including only RMs and MTFs. Trades executed in Euronext opening and closing auctions (UTP system) are included. OTC and internalisation are excluded.

Chart 6. Distribution of trading volumes between RMs and MTFs, SBF 120 stocks not in CAC 40 index, October 2007 to September 2009



These statistics are based on a reduced transaction universe including only RMs and MTFs. Trades executed in Euronext opening and closing auctions (UTP system) are included. OTC and internalisation are excluded.

III.2. Fragmentation of non-internalised order flow, October 2007 to September 2009

To estimate the change in fragmentation between October 2007 and September 2009, volumes executed OTC are excluded from the analysis for the sake of comparability, since these volumes were not reported in October 2007, i.e. pre-MiFID, and only fragmentation between multilateral platforms is comparable across all the observation periods.

Charts 4 to 6, which look at the FTSE 100, the CAC 40 and SBF 120 stocks not included in the CAC 40 respectively, describe the market share of the primary market, the aggregated market share of the other two RMs and the share of the MTFs over each of the four observation months in 2007 and 2009. In Chart 4, which considers the FTSE 100, LSE's market share is separated into volumes executed on the SETS order book and off-book transactions executed by LSE members according to the counterparty principle. Table 4 lists the monthly market shares of all the markets and provides a fragmentation index[3] in the last column, which reveals that fragmentation was substantial in June and September 2009 (around 1.9 for the CAC 40 and FTSE 100 and between 1.4 and 1.5 for the non-CAC 40 SBF 120) and was at an intermediate level in January 2009. In the two samples of large caps, the primary market's share of non-internalised volumes fell from over 95% in October 2007 to around 70% in the final period. Among French mid caps, the primary market's share remained above 80% in September 2009. The share of volumes executed on MTFs stabilised at over 25% for CAC 40 constituents and reached about 30% for FTSE 100 constituents, but did not exceed 18% for the smaller stocks of the SBF 120.

The structure of the large-cap order flow on LSE changed radically between 2007 and 2009, reflecting competition from MTFs and increased automation of securities trading. In October 2007, over 40% of trading volumes were executed by LSE members off the order book, but by September 2009, just 13.6% of LSE's 69% market share was traded off-book. According to Chart 4, the SETS system has not really lost market share, but the off-book order flow seems to have diminished as the competition has gained ground.

[3] Fidessa, a company that provides trading systems, market data and connectivity solutions, uses this index to measure market fragmentation. It is the inverse of the sum of the squares of the market shares of the different trading venues. Its minimum value is 1 when order flow is totally concentrated on one market.

III. LIQUIDITY AND RELATIVE COMPETITIVENESS OF DIFFERENT MARKETS

Three metrics are used to measure liquidity: quoted spreads, effective spreads, and displayed depth at best limits.

Quoted spreads

At a given time, the quoted spread is the difference between the best ask price and the best bid price quoted on a market relative to their median value. It measures the implicit transaction cost borne on the purchase and instant resale of a unit of stock. In the data provided by IFS, quoted spreads are observable for every second in the session. The quoted spread observed for a given market will be called the local quoted spread. A global quoted spread is calculated by comparing the best limits on all platforms and distinguishing between the ask price on the platform offering the lowest best ask limit and the bid price on the platform offering the highest best bid limit.

Local quoted spreads for the primary market and the four main MTFs[4] and global quoted spreads are averaged for each stock and each month in the study. Monthly average quoted spreads are then computed for each sample by weighting the averages of the individual stocks by market capitalisation[5].

Effective spreads

The effective spread is the implicit cost paid on a given transaction. It corresponds to the difference between the transaction price and the median price observed on the market at the time of the transaction, measured as a percentage of the median price. It is doubled to make it comparable with the quoted spread. The median price used as the baseline is the global median price, i.e. the mid-point of the best bid and ask prices, all markets combined.

Average effective spreads for each month and sample are prepared in the same way as average quoted spreads, except that in the case of effective spreads, the averages per stock are weighted by transaction size. The transaction universe used to calculate these averages is reduced to trades executed in on-book continuous trading. OTC, internalised and off-book transactions are excluded. Local effective spreads are obtained by averaging the effective spreads of transactions

[4] BATS Europe, Chi-X, Nasdaq OMX Europe and Turquoise.
[5] Market capitalisation for weighting purposes is the average of the stock's market capitalisation at 1 October 2007 and at 30 September 2009. Capitalisation data are taken from Datastream.

executed on each individual market, and global effective spreads are obtained by averaging spreads for all the markets.

Depth at best limits

Depth at best limits is the sum of the quantities associated with the best bid and ask prices. It can be understood at the quantity of stock that can be instantaneously exchanged with no impact on quoted prices. To ensure that depth is comparable between stocks regardless of price level, it is expressed in terms of capital, specifically in thousands of euros, by multiplying quantities by the median price[6]. Global depth is determined by aggregating the quantities demanded at the best bid limit on all markets quoting the best bid price and the quantities offered at the best ask limit on all markets quoting the best ask price. Average depths are then calculated using the same procedure as for average quoted spreads.

III.1. *Price spreads*

The global and local spreads of the primary markets, which are reported in Tables 5 and 6, narrowed between October 2007 and September 2009 for the three samples. The biggest decline was on the FTSE 100, where the average global quoted spread fell from 9.21 to 5.43 bps and LSE's average local quoted spread fell from 9.21 to 7.07 bps. Spreads narrowed far less dramatically for the mid caps of the SBF 120. Effective spreads contracted by less than quoted spreads but nonetheless narrowed significantly, except in the case of SBF 120 mid caps. The decline in spreads is especially noteworthy given that the average volatility of individual stocks was higher in September 2009 than in October 2007 despite returning to levels on a par with those of the pre-MiFID period.

[6] For FTSE 100 stocks, prices are converted to euros based on daily exchange rates extracted from www.oanda.com.

Table 5. Quoted spreads, October 2007 to September 2009

Sample	Period	Index volatility	Stock volatility	Global – All markets	Primary market	Chi-X	BATS Europe	Turquoise	Nasdaq OMX Eur.
FTSE 100 stocks	**Oct. 2007**	0.91%	1.66%	0.0921%	0.0921%				
	Jan. 2009	1.90%	9.99%	0.0898%	0.1129%	0.1275%	0.1688%	0.4060%	0.2803%
	Jun. 2009	1.16%	6.03%	0.0638%	0.0864%	0.0862%	0.1024%	0.1614%	0.1295%
	Sep. 2009	0.77%	3.81%	0.0543%	0.0707%	0.0695%	0.0801%	0.0949%	0.1100%
CAC 40 stocks	**Oct. 2007**	0.70%	1.37%	0.0604%	0.0617%				
	Jan. 2009	2.42%	9.74%	0.0644%	0.0943%	0.1121%	0.1871%	0.1107%	0.3566%
	Jun. 2009	1.43%	4.41%	0.0502%	0.0735%	0.0714%	0.0850%	0.1728%	0.1191%
	Sep. 2009	0.90%	3.58%	0.0446%	0.0595%	0.0606%	0.0933%	0.0833%	0.0989%
SBF 120 stocks not in CAC 40	**Oct. 2007**	---	1.63%	0.1452%	0.1454%				
	Jan. 2009	---	12.12%	0.2502%	0.2644%	0.3064%	0.2848%	0.0053%	0.2975%
	Jun. 2009	---	4.99%	0.1615%	0.1945%	0.2650%	0.3375%	0.4252%	0.3924%
	Sep. 2009	---	4.85%	0.1198%	0.1399%	0.2722%	0.3017%	0.2553%	0.2882%

This table reports average global quoted spreads and average local quoted spreads for the primary market and the four leading MTFs, by month and by sample. The third column shows the volatility of daily returns on the index during the month. The fourth column is the capitalisation-weighted average volatility of daily returns for the stocks in the sample.

Table 6. Effective spreads, October 2007 to September 2009

Sample	Period	Index volatility	Stock volatility	Global – All markets	Primary market	Chi-X	BATS Europe	Turquoise	Nasdaq OMX Eur.
FTSE 100 stocks	**Oct. 2007**	0.91%	1.66%	0.0744%	0.0744%				
	Jan. 2009	1.90%	9.99%	0.0721%	0.0716%	0.0780%	0.0739%	0.0642%	0.0833%
	Jun. 2009	1.16%	6.03%	0.0669%	0.0756%	0.0547%	0.0508%	0.0518%	0.0574%
	Sep. 2009	0.77%	3.81%	0.0591%	0.0680%	0.0496%	0.0428%	0.0464%	0.0433%
CAC 40 stocks	**Oct. 2007**	0.70%	1.37%	0.0493%	0.0493%				
	Jan. 2009	2.42%	9.74%	0.0614%	0.0612%	0.0637%	0.0592%	0.0597%	0.0730%
	Jun. 2009	1.43%	4.41%	0.0506%	0.0511%	0.0509%	0.0468%	0.0460%	0.0630%
	Sep. 2009	0.90%	3.58%	0.0414%	0.0408%	0.0442%	0.0413%	0.0425%	0.0461%
SBF 120 stocks not in CAC 40	**Oct. 2007**	---	1.63%	0.1130%	0.1129%				
	Jan. 2009	---	12.12%	0.2010%	0.2010%	0.0778%	0.1055%	0.0161%	0.1122%
	Jun. 2009	---	4.99%	0.1408%	0.1394%	0.1443%	0.1585%	0.1334%	0.2323%
	Sep. 2009	---	4.85%	0.1129%	0.1117%	0.1147%	0.1309%	0.1091%	0.1674%

This table reports average global effective spreads and average local effective spreads for the primary market and the four leading MTFs, by month and by sample. These statistics are based on a reduced universe comprising transactions exchanged in on-book continuous trading. The third column shows the volatility of daily returns on the index during the month. The fourth column is the capitalisation-weighted average volatility of daily returns for the stocks in the sample.

Table 7. Depth at best limits, October 2007 to September 2009

Echantillon	Période	Global - Tous marchés	Marché primaire	Chi-X	BATS Europe	Turquoise	Nasdaq OMX Eur.	Somme des moyennes (Nasdaq OMX exclus)
Titres du FTSE 100	**Oct. 2007**	531,017	531,017					531,017
	Jan. 2009	118,782	113,545	106,008	78,746	88,798	16,484	387,097
	Juin 2009	137,711	159,549	131,612	83,381	36,401	51,881	410,943
	Sep. 2009	142,950	134,107	116,373	68,551	38,685	68,272	357,716
Titres du CAC 40	**Oct. 2007**	132,637	137,146					137,146
	Jan. 2009	43,280	41,015	34,062	32,386	33,798	33,172	141,261
	Juin 2009	44,582	43,194	29,296	25,813	23,224	23,562	121,527
	Sep. 2009	59,401	54,846	38,263	27,556	28,664	18,279	149,329
Titres du SBF120 n'appartenant pas au CAC 40	**Oct. 2007**	35,028	35,222					35,222
	Jan. 2009	16,937	16,919	8,329	7,079	0,339	6,285	32,666
	Juin 2009	17,955	18,216	14,489	12,610	13,110	13,069	58,425
	Sep. 2009	21,113	21,594	14,378	13,153	13,459	11,432	62,584

This table reports average global depth and average local depth for the primary market and the four main MTFs, by month and by sample, expressed in thousands of euros. Quantities taken into account are disclosed quantities at best limits. The last column is the sum of average depths on the primary market, Chi-X, Turquoise and BATS Europe.

Table 8. Average transaction size, October 2007 to September 2009

Sample	Period	Average transaction size, EUR 000
FTSE 100 stocks	Oct. 2007	91.227
	Jan. 2009	18.037
	Jun. 2009	19.924
	Sep. 2009	18.444
CAC 40 stocks	Oct. 2007	44.557
	Jan. 2009	16.151
	Jun. 2009	14.830
	Sep. 2009	17.208
SBF 120 stocks not in CAC 40	Oct. 2007	16.077
	Jan. 2009	7.858
	Jun. 2009	6.988
	Sep. 2009	7.842

Table 9. Time at one of the best limits, primary market and main MTFs, October 2007 to September 2009

Sample	Period	Primary market	Chi-X	BATS Europe	Turquoise	Nasdaq OMX Eur.
FTSE 100 stocks	Oct. 2007	100.00%				
	Jan. 2009	68.28%	57.59%	15.12%	23.70%	1.82%
	Jun. 2009	70.36%	60.72%	19.63%	13.52%	7.01%
	Sep. 2009	72.31%	56.16%	17.80%	12.63%	9.52%
CAC 40 stocks	Oct. 2007	99.84%				
	Jan. 2009	56.18%	59.72%	14.93%	37.18%	2.45%
	Jun. 2009	57.87%	58.31%	31.77%	15.14%	4.55%
	Sep. 2009	65.90%	59.01%	17.95%	20.85%	4.46%
SBF 120 stocks not in CAC 40	Oct. 2007	99.99%				
	Jan. 2009	92.78%	26.41%	3.14%	1.10%	0.61%
	Jun. 2009	68.87%	63.07%	11.61%	12.15%	1.42%
	Sep. 2009	78.87%	53.13%	5.47%	15.01%	1.76%

Spreads declined steadily over the three months observed in 2009, despite high volatility in January and June 2009. Spreads did widen for Euronext stocks in January 2009, but this was weak compared with the surge in the volatility of the CAC 40 index and individual stocks over the period.

III.2. *Depth*

Depth did not display such a favourable change over the same period. Between October 2007 and September 2009, average global depth was divided by 3.7 for FTSE 100 stocks, by 2.2 for CAC 40 stocks and 1.7 for the SBF 120. Local depth on the primary markets showed a similar change between the two periods. Although substantial, the reduction in depth is far smaller than the decline in average transaction size. Whereas depth was divided by 3.7 on average for FTSE 100 stocks, average transaction size was divided by 5. Average size was divided by 2.6 for CAC 40 stocks and by 2 for the other stocks of the SBF 120.

These figures also have to be set in the context of the sharp decline in trading volumes between October 2007 and September 2009 (cf. Table 4): -59% for FTSE 100 stocks, -28% for CAC 40 stocks and -32% for the other stocks of the SBF 120.

Moreover, the statistics in the table reveal dispersion in instant depth across the competing systems. If we sum the local depths of the primary market and the three most active MTFs, the total goes down only for FTSE 100 stocks. It is relatively stable for the CAC 40, and actually increases among SBF 120 constituents that are not in the CAC 40.

Additionally, the measure of depth used in this study, which is the most widely used indicator, is a static measure of instantly available quantities. It does not take account of the frequency with which these quantities are renewed. Yet with the proliferation of trading facilities and the rise of algorithmic trading, the frequency of order submission has increased exponentially and orders are much more broken up. In an ideal world, we would measure depth dynamically, but the data do not allow this.

III.3. *Price competitiveness of different markets*

A comparison of the local price spreads provided in Tables 5 and 6, and the time spent by each market at at least one of the best limits, reported in Table 9, show that the primary markets remain highly price competitive. In terms of effective spreads, MTFs are well positioned. In terms of quoted spreads and time at best limits, Chi-X is the clear leader and is best positioned relative to the primary market. It is also the only MTF whose time at one of the best limits exceeds 50% for all stocks, including those of the SBF 120 that do not belong to the CAC 40. Its competitiveness relative to the primary market is better for UK stocks than for French stocks.

CONCLUSION

Based on two samples of non-financial large caps from the FTSE 100 and the CAC 40 and a third sample of non-financial mid caps from the SBF 120, this study looks at four monthly periods to compare market liquidity before and after the entry into effect of MiFID. Over the last monthly period, i.e. September 2009, order-flow fragmentation reached substantial levels in all three samples, although it was less pronounced among the mid caps of the SBF 120. Between 20% and 25% of total volumes on the FTSE 100 and the CAC 40 were traded OTC or internalised. As regards non-internalised regulated order flow, 25% to 30% of volumes in large caps were executed on MTFs outside the primary market, compared with around 17% for mid caps of the SBF 120. Despite the high levels of fragmentation, primary markets continue to dominate the European securities trading landscape, with market share of approximately 70% for regulated volumes in large caps and 80% for mid caps. The primary markets also have good relative price competitiveness.

The rise in competition between trading venues has been accompanied by a significant decline in price spreads. This reduction in implicit transaction costs is relatively proportionate to the strength of competition, because it is more marked among large caps than among mid caps. The decline has take place at the cost of reduced depth at best limits. Several points temper this conclusion, however. First, trading volumes fell sharply between October 2007 and September 2009. Next, competition between trading systems combined with the rise of algorithmic trading have resulted in orders being more broken up, such that average transaction size has fallen even more steeply than depth at best limits. The frequency of trading and quote changes has also increased greatly. In such an environment, a static measurement of depth has drawbacks, because the frequency with which the depth is renewed is not captured. Also, the available depth appears to be divided between the most active platforms. Ultimately, increased competition has resulted in a decline in implicit transaction costs. The investors best placed to take advantage are logically those that operate on several platforms through smart order routing systems.

ANNEX - DETAILED COMPOSITION OF SAMPLES

Index	Stock	Average market capitalisation, EUR million
FTSE 100 (51 stocks)	BP	133,845
	ROYAL DUTCH SHELL A(LON)	113,332
	GLAXOSMITHKLINE	87,660
	ROYAL DUTCH SHELL B	65,670
	RIO TINTO	53,171
	BHP BILLITON	49,969
	ASTRAZENECA	48,368
	BRITISH AMERICAN TOBACCO	46,427
	ANGLO AMERICAN	46,254
	BG GROUP	40,568
	XSTRATA	38,216
	SABMILLER	27,854
	UNILEVER (UK)	27,041
	BT GROUP	23,505
	NATIONAL GRID	22,805
	BAE SYSTEMS	19,054
	BRITISH SKY BCAST.GROUP	14,073
	ROLLS-ROYCE GROUP	11,609
	MARKS & SPENCER GROUP	10,761
	SAINSBURY (J)	10,517
	ANTOFAGASTA	9,769
	MORRISON(WM)SPMKTS.	9,487
	LAND SECURITIES GROUP	8,218
	KAZAKHMYS	8,215
	ASSOCIATED BRIT.FOODS	8,083
	COMPASS GROUP	8,060
	TULLOW OIL	8,038
	VEDANTA RESOURCES	7,227
	SMITH & NEPHEW	6,610
	BRITISH LAND	6,433
	CARNIVAL	6,013
	KINGFISHER	5,814
	CAPITA GROUP	5,583
	CABLE & WIRELESS	5,349
	NEXT	4,918
	SMITHS GROUP	4,869
	BRITISH AIRWAYS	4,656
	LIBERTY INTL.	4,383
	JOHNSON MATTHEY	4,212
	SAGE GROUP	4,020
	REXAM	3,851
	HOME RETAIL GROUP	3,751
	SEVERN TRENT	3,627
	ICTL.HTLS.GP.	3,391
	RENTOKIL INITIAL	3,335
	PETROFAC	3,032
	COBHAM	2,946
	INMARSAT	2,861
	SERCO GROUP	2,804
	RANDGOLD RESOURCES	2,799
	INTERTEK GROUP	2,159

Index	Stock	Average market capitalisation, EUR million
	TOTAL	115,329
	EDF	105,285
	SANOFI-AVENTIS	73,545
	FRANCE TELECOM	54,815
	GDF SUEZ	52,424
	L'OREAL	49,503
	LVMH	37,689
	VIVENDI	30,482
	CARREFOUR	28,316
	DANONE	27,520
	VINCI (EX.SGE)	23,442
	SAINT GOBAIN	23,252
	AIR LIQUIDE	21,688
	VEOLIA ENVIRON.	20,693
	SCHNEIDER ELECTRIC	20,242
CAC 40	RENAULT	19,653
(32 stocks)	LAFARGE	18,168
	ALSTOM	17,335
	BOUYGUES	16,591
	PERNOD RICARD	15,463
	EADS	15,041
	PPR	14,186
	ACCOR	11,892
	ALCATEL-LUCENT	11,650
	MICHELIN	10,965
	PEUGEOT	9,313
	ESSILOR INTL.	8,733
	VALLOUREC	8,728
	STMICROELECTRONICS	8,306
	LAGARDERE S.C.A.	6,152
	TECHNIP	5,882
	CAP GEMINI	5,838

Index	Stock	Average market capitalisation, EUR million
SBF 120 (excl. CAC 40, 57 stocks)	HERMES INTL	9,535
	SES	8,216
	THALES	7,545
	SODEXO	7,109
	ADP	7,045
	CASINO GUICHARD	6,550
	GECINA NOM.	6,248
	SAFRAN	6,184
	AIR FRANCE -KLM	5,714
	LEGRAND	5,705
	EIFFAGE	5,639
	PUBLICIS GROUPE SA	5,602
	KLEPIERRE	5,274
	DASSAULT SYSTEMES	5,008
	CGG VERITAS	4,386
	JC DECAUX SA.	4,372
	EUTELSAT COMMUNIC.	4,212
	ILIAD	3,892
	CIMENTS FRANCAIS	3,831
	IMERYS	3,525
	TF1	3,287
	PAGESJAUNES	3,266
	BIC	2,645
	ATOS ORIGIN	2,606
	NEOPOST	2,532
	METROPOLE TV	2,496
	GEMALTO	2,347
	NEXANS	2,293
	VALEO	2,231
	BOURBON	2,224
	ZODIAC AEROSPACE	2,145
	ARKEMA	2,039
	S.E.B.	2,014
	REMY COINTREAU	1,853
	NEXITY	1,849
	RHODIA	1,837
	MAUREL ET PROM	1,740
	UBISOFT ENTERTAIN	1,703
	THOMSON (EX:TMM)	1,641
	HAVAS	1,510
	TELEPERFORMANCE	1,405
	BENETEAU	1,379
	ORPEA	1,351
	VILMORIN & CIE	1,146
	SOITEC	925
	DERICHEBOURG	873
	IPSOS	806
	INGENICO	800
	AREVA CI	794

	ALTEN	702
	GROUPE STERIA	698
	EUROFINS SCIENT.	681
	CLUB MEDITERRANEE	666
	BONDUELLE	659
	CARBONE LORRAINE	631
	ALTRAN TECHN.	566
	SPERIAN PROTECTION	545
	ALTEN	702
	GROUPE STERIA	698
	EUROFINS SCIENT.	681
	CLUB MEDITERRANEE	666
	BONDUELLE	659
	CARBONE LORRAINE	631
	ALTRAN TECHN.	566
	SPERIAN PROTECTION	545

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